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1 [Rendering: A quadrilateral rendering primitive](#)



Kai Hormann, Marco Tarini

August 2004 **Proceedings of the ACM SIGGRAPH/EUROGRAPHICS conference on Graphics hardware**

Publisher: ACM Press

Full text available: [pdf\(12.22 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

The only surface primitives that are supported by common graphics hardware are triangles and more complex shapes have to be triangulated before being sent to the rasterizer. Even quadrilaterals, which are frequently used in many applications, are rendered as a pair of triangles after splitting them along either diagonal. This creates an undesirable C^1 -discontinuity that is visible in the shading or texture signal. We propose a new method that overcomes this drawback and is designed t ...

4 Algebraic surface design with Hermite interpolation



Chanderjit L. Bajaj, Insung Ihm

January 1992 **ACM Transactions on Graphics (TOG)**, Volume 11 Issue 1

Publisher: ACM Press

Full text available: pdf(8.01 MB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#), [review](#)

This paper presents an efficient algorithm called Hermite interpolation, for constructing low-degree algebraic surfaces, which contain, with C1 or tangent plane continuity, any given collection of points and algebraic space curves having derivative information. Positional as well as derivative constraints on an implicitly defined algebraic surface are translated into a homogeneous linear system, where the unknowns are the coefficients of the polynomial ...

Keywords: Algebraic surface, Hermite interpolation, computer-aided geometric design, geometric continuity, linear systems

5 Tracing ray differentials



Homan Igehy

July 1999 **Proceedings of the 26th annual conference on Computer graphics and interactive techniques**

Publisher: ACM Press/Addison-Wesley Publishing Co.

Full text available: pdf(1.05 MB)

Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

6 Real-time volume graphics



Klaus Engel, Markus Hadwiger, Joe M. Kniss, Aaron E. Lefohn, Christof Rezk Salama, Daniel Weiskopf

August 2004 **Proceedings of the conference on SIGGRAPH 2004 course notes GRAPH '04**

Publisher: ACM Press

Full text available: pdf(7.63 MB)

Additional Information: [full citation](#), [abstract](#)

The tremendous evolution of programmable graphics hardware has made high-quality real-time volume graphics a reality. In addition to the traditional application of rendering volume data in scientific visualization, the interest in applying these techniques for real-time rendering of atmospheric phenomena and participating media such as fire, smoke, and clouds is growing rapidly. This course covers both applications in scientific visualization, e.g., medical volume data, and real-time rendering, ...

7 Real-time shading



Marc Olano, Kurt Akeley, John C. Hart, Wolfgang Heidrich, Michael McCool, Jason L. Mitchell, Randi Rost

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8 A family of tangent continuous cubic algebraic splines




Marco Paluszny, Richard R. Patterson

July 1993 **ACM Transactions on Graphics (TOG)**, Volume 12 Issue 3

Publisher: ACM Press


Keywords: cubic ovals, cubic splines, implicit curves, interpolation, piecewise algebraic curves

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 David Luebke, Mark Harris, Jens Krüger, Tim Purcell, Naga Govindaraju, Ian Buck, Cliff Woolley, Aaron Lefohn


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Keywords: discrete smooth interpolation, non distorted texture mapping, optimization, parametrization

11 A survey of methods for recovering quadrics in triangle meshes

 Sylvain Petitjean

June 2002 **ACM Computing Surveys (CSUR)**, Volume 34 Issue 2

Publisher: ACM Press

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Keywords: algebraic surface, computer-aided geometric design, constrained quadratic optimization, distributed geometric-design environment, geometric continuity

13 Multiresolution analysis for surfaces of arbitrary topological type



Michael Lounsbery, Tony D. DeRose, Joe Warren

January 1997 **ACM Transactions on Graphics (TOG)**, Volume 16 Issue 1

Publisher: ACM Press

Full text available: pdf(4.63 MB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Multiresolution analysis and wavelets provide useful and efficient tools for representing functions at multiple levels of detail. Wavelet representations have been used in a broad range of applications, including image compression, physical simulation, and numerical analysis. In this article, we present a new class of wavelets, based on subdivision surfaces, that radically extends the class of representable functions. Whereas previous two-dimensional methods were restricted to functions dif ...

Keywords: compression, geometric modeling, level-of-detail control, splines, subdivision surfaces, wavelets

14 Texture synthesis: Texture design using a simplicial complex of morphable textures



Wojciech Matusik, Matthias Zwicker, Frédo Durand

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Keywords: data-driven models, image warping, morphable models, texture synthesis

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David P. Dobkin, Allan R. Wilks, Silvio V. F. Levy, William P. Thurston

October 1990 **ACM Transactions on Graphics (TOG)**, Volume 9 Issue 4

Publisher: ACM Press

Full text available: pdf(2.74 MB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#), [review](#)

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Xuejun Hao, Amitabh Varshney

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Publisher: ACM Press

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Keywords: BSSRDF, local illumination, reflection models, subsurface scattering

18 View interpolation for image synthesis



Shenchang Eric Chen, Lance Williams

September 1993 **Proceedings of the 20th annual conference on Computer graphics and interactive techniques**

Publisher: ACM Press

Full text available: [pdf\(2.18 MB\)](#) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

Keywords: image morphing, incremental rendering, interpolation, motion blur, motion compensation, real-time display, shadow, virtual holography, virtual reality

19 Pattern-based texturing revisited



Fabrice Neyret, Marie-Paule Cani

July 1999 **Proceedings of the 26th annual conference on Computer graphics and interactive techniques**

Publisher: ACM Press/Addison-Wesley Publishing Co.

Full text available: [pdf\(2.02 MB\)](#) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

Keywords: non-periodic tiling, patterns, texture mapping, texture synthesis

20 Creating multisided rational Bézier surfaces using base points



Joe Warren

April 1992 **ACM Transactions on Graphics (TOG)**, Volume 11 Issue 2

Publisher: ACM Press

Full text available: [pdf\(4.41 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

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Bruno Lévy, Jean-Laurent Mallet

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Keywords: discrete smooth interpolation, non distorted texture mapping, optimization, parametrization

10 A survey of methods for recovering quadrics in triangle meshes



Sylvain Petitjean

June 2002 **ACM Computing Surveys (CSUR)**, Volume 34 Issue 2

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Keywords: data-driven models, image warping, morphable models, texture synthesis

13 Modeling with cubic A-patches



Chandrajit L. Bajaj, Jindon Chen, Guoliang Xu

April 1995 **ACM Transactions on Graphics (TOG)**, Volume 14 Issue 2

Publisher: ACM Press

Full text available: pdf(6.74 MB) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

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Keywords: image morphing, incremental rendering, interpolation, motion blur, motion compensation, real-time display, shadow, virtual holography, virtual reality

16 Constrained texture mapping for polygonal meshes



Bruno Lévy

August 2001 **Proceedings of the 28th annual conference on Computer graphics and interactive techniques**

Publisher: ACM Press

Full text available: pdf(11.25 MB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Recently, time and effort have been devoted to automatic texture mapping. It is possible to study the parameterization function and to describe the texture mapping process in

terms of a functional optimization problem. Several methods of this type have been proposed to minimize deformations. However, these existing methods suffer from several limitations. For instance, it is difficult to put details of the texture in correspondence with features of the model, since most of the existing method ...

Keywords: paint systems, polygonal modeling, texture mapping

17 The symmetric analogue of the polynomial power basis



J. Sánchez-Reyes

July 1997 **ACM Transactions on Graphics (TOG)**, Volume 16 Issue 3

Publisher: ACM Press

Full text available: pdf(633.83 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

A new polynomial basis over the unit interval $t \in [0,1]$ is proposed. The work is motivated by the fact that the monomial (power) form is not suitable in CAGD, as it suffers from serious numerical problems, and the monomial coefficients have no geometric meaning. The new form is the symmetric analogue of the power form, because it can be regarded as an "Hermite two-point expansion" instead of a Taylor ...

Keywords: Ball basis, Bernstein-Bézier basis, Hermite interpolation, degree reduction, monomial form, power basis, symmetric power

18 Creating multisided rational Bézier surfaces using base points



Joe Warren

April 1992 **ACM Transactions on Graphics (TOG)**, Volume 11 Issue 2

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Keywords: blowing up, multisided patches

19 Techniques for conic splines



Vaughan Pratt

July 1985 **ACM SIGGRAPH Computer Graphics, Proceedings of the 12th annual conference on Computer graphics and interactive techniques SIGGRAPH '85**, Volume 19 Issue 3

Publisher: ACM Press

Full text available: pdf(1.07 MB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

A number of techniques are presented for making conic splines more effective for 2D computer graphics. We give a brief account of the theory of conic splines oriented to computer graphics. We make Pitteway's algorithm exact, and repair an "aliasing" problem that has plagued the algorithm since its introduction in 1967. The curvature-matching problem for conics is solved by way of a simple formula for curvature at an endpoint which permits curvature to be matched exactly at non-inflection points ...

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Keywords: Data fitting, geometry enhancement, local geometry estimation, mesh fairing, shape recovery

5 Rendering: Interactive rendering of caustics using interpolated warped volumes

Manfred Ernst, Tomas Akenine-Möller, Henrik Wann Jensen

May 2005 **Proceedings of the 2005 conference on Graphics interface GI '05**

Publisher: Canadian Human-Computer Communications Society

Full text available: [pdf\(921.22 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#)

In this paper we present an improved technique for interactive rendering of caustics using programmable graphics hardware. Previous real-time methods have used simple prisms for the caustic volumes and a constant intensity approximation at the receiver. Our approach uses interpolated caustic volumes to render smooth high-quality caustics. We have derived a simple formula for evaluating the density of wave-fronts along a caustic ray, and we have developed a precise method for rendering caustic vo ...

Keywords: caustic volumes, caustics, graphics hardware, real-time rendering, volume caustics

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Shenchang Eric Chen, Lance Williams

September 1993 **Proceedings of the 20th annual conference on Computer graphics and interactive techniques**

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8 Tracing ray differentials



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July 1999 **Proceedings of the 26th annual conference on Computer graphics and**


9 Modeling II: Cellular-functional modeling of heterogeneous objects



Valery Adzhiev, Elena Kartasheva, Toshiyasu Kunii, Alexander Pasko, Benjamin Schmitt

June 2002 **Proceedings of the seventh ACM symposium on Solid modeling and applications**

Publisher: ACM Press

Full text available:  [pdf\(387.61 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

The paper presents an approach to modeling heterogeneous objects as multidimensional point sets with multiple attributes (hypervolumes). A theoretical framework is based on a hybrid model of hypervolumes combining a cellular representation and a constructive representation using real-valued functions. This model allows for independent but unifying representation of geometry and attributes, and makes it possible to represent dimensionally non-homogeneous entities and their cellular decompositions ...

Keywords: attributes, cellular representation, function representation, heterogeneous models, multidimensional point sets, volume modeling

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TIMOUR (US); (+1)

Applicant:

EC: G06F17/17M; G06T15/20

IPC: **G06F17/17; G06T15/20; G06F17/17** (+2)

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